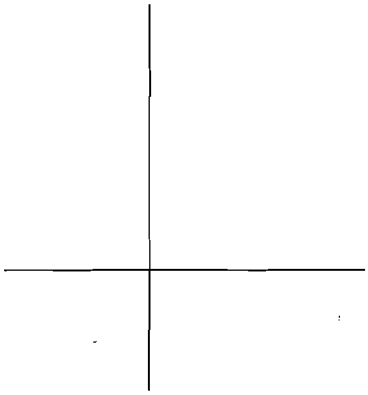
AP Calculus AB Name_____

Worksheet - Area Between Two Curves (B) Date_____

Sketch the graphs, shade the bounded region, set up the integral expression that will find the area bounded by the given expressions, integrate, show the fundamental theorem of calculus, calculate the area with the calculator.

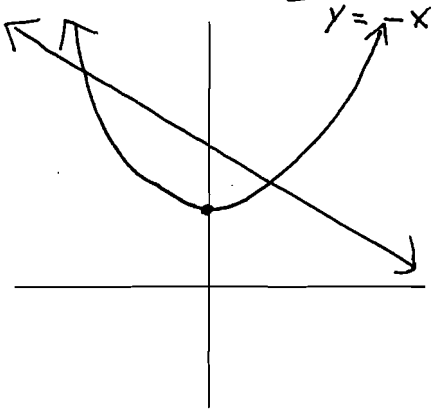
1) $x = y - 2$ *and* $y = x^2$



2) $y = x^2 + 4$ *and* $x + y = 6$

$-x \quad -x$

$y = -x + 6$



Bounds: $x^2 + 4 = -x + 6$

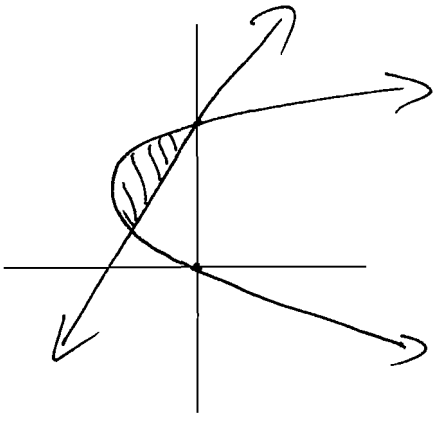
$x = -2, 1$

$$\int_{-2}^{1} \left[(-x+6) - (x^2+4)\right] dx$$

$$\int_{-2}^{1} (-x^2 - x + 2)\, dx$$

$$-\tfrac{1}{3}x^3 - \tfrac{1}{2}x^2 + 2x \Big|_{-2}^{1} = 4.5 \text{ u}^2$$

3) $x = y^2 - 3y$ and $x - y + 3 = 0$



Bounds: $y^2 - 3y = y - 3$

$y^2 - 4y + 3 = 0$

$(y-3)(y-1) = 0$

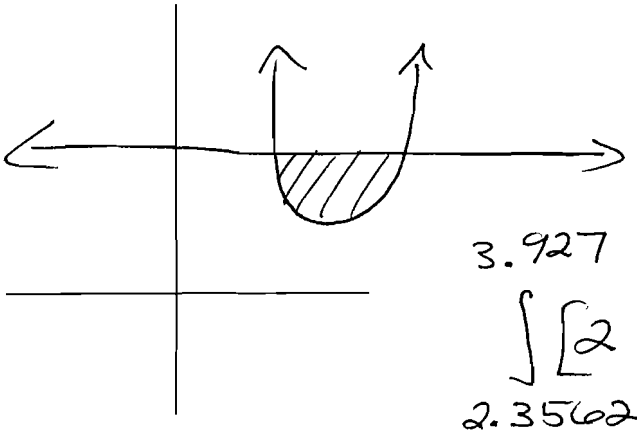
$y = 3, 1$

$$\int_1^3 (y-3) - (y^2 - 3y)\,dy$$

$$\int_1^3 (-y^2 + 4y - 3)\,dy = -\frac{1}{3}y^3 + 2y^2 - 3y \Big|_1^3$$

$$\left[\frac{1}{3}(3)^3 + 2(3)^2 - 3(3)\right] - \left[\frac{1}{3}(1)^3 + 2(1) - 3(1)\right] = 1.3333\ u^2$$

4) $y = \sec^2 x$ and $y = 2$ $\left\{\text{domain}: \frac{\pi}{2} < x < \frac{3\pi}{2}\right\}$



Bounds:

$\sec^2(x) = 2$

$x = 2.3562, 3.927$

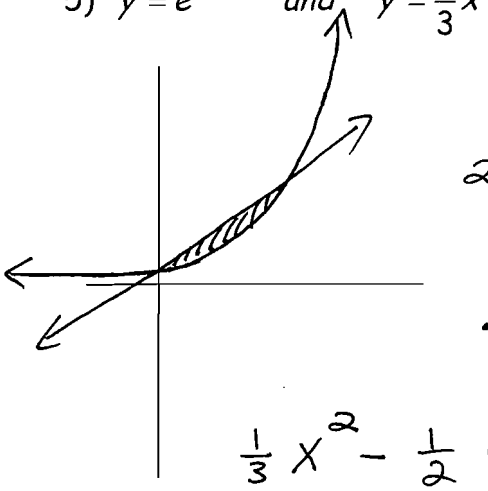
$$\int_{2.3562}^{3.927} [2 - \sec^2(x)]\,dx$$

$$2x - \tan(x) \Big|_{2.3562}^{3.927} =$$

$$[2(3.927) - \tan(3.927)] - [2(2.3562) - \tan(3.927)] =$$

$1.1373\ u^2$

5) $y = e^{2x-4}$ and $y = \frac{2}{3}x$



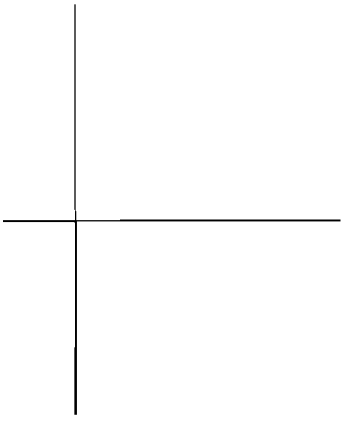
Bounds: $e^{2x-4} = \frac{2}{3}x$

$x = .0291, 2.189$

$$\int_{.0291}^{2.189} \left(\frac{2}{3}x - e^{2x-4}\right) dx$$

$$\frac{1}{3}x^2 - \frac{1}{2}e^{2x-4}\Big|_{.0291}^{2.189} = .877\ u^2$$

6) $y = x^3 - 4x$ and $y = 0$



ans: $8\ u^2$